J. F. ISBELL.

HEAD MOTION FOR ORE CONCENTRATORS.

APPLICATION FILED MAY 13, 1910.

1,019,650.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.

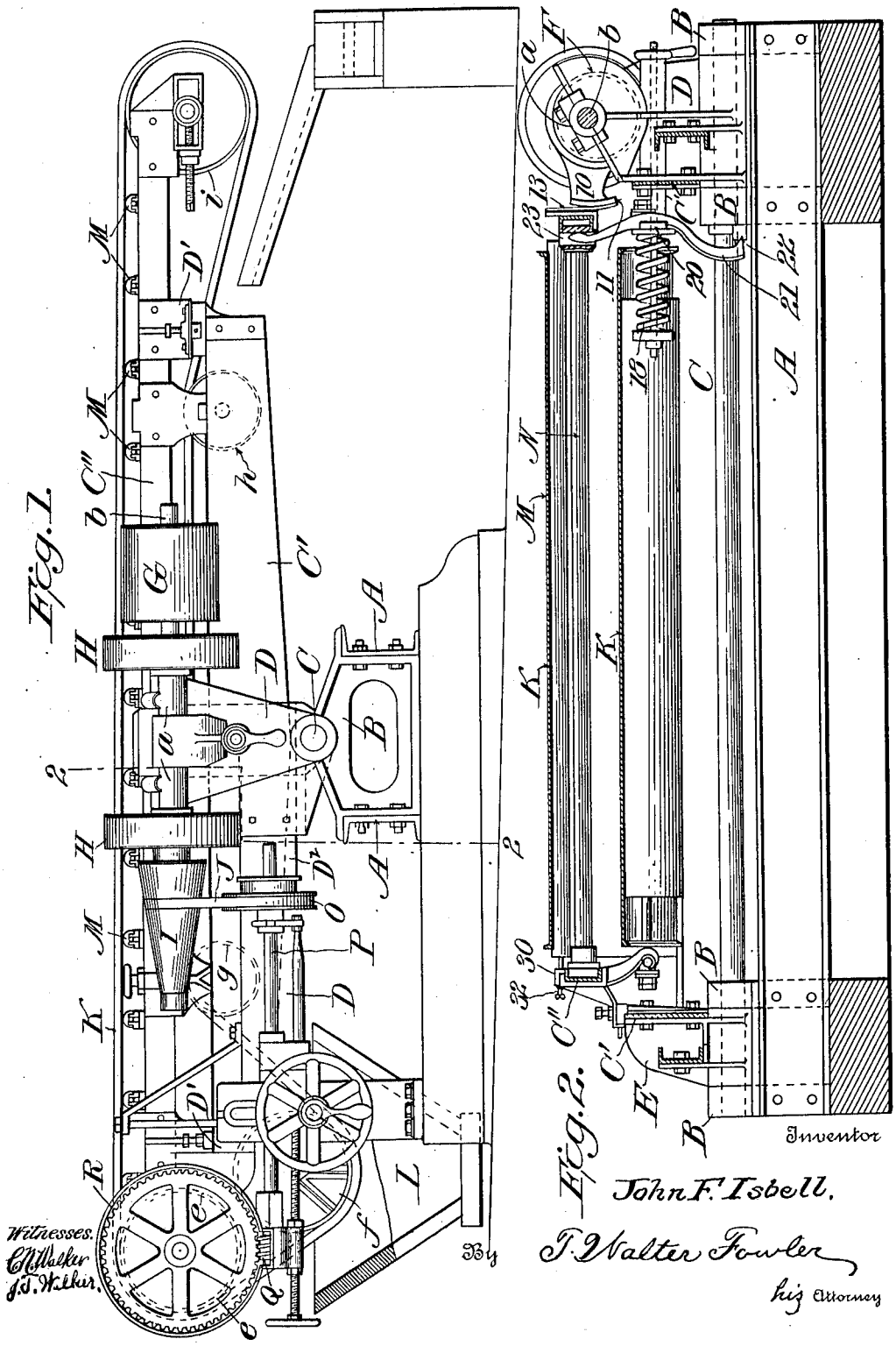

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Fig. 3.

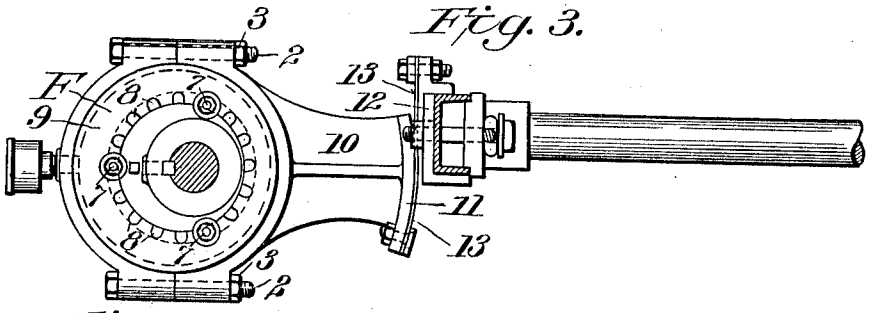


Fig. 4.

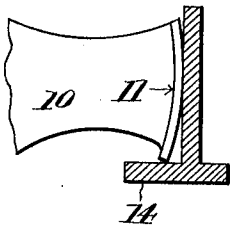


Fig. 5.

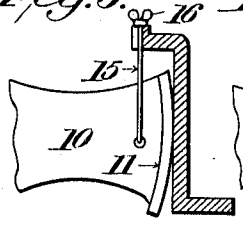


Fig. 6.

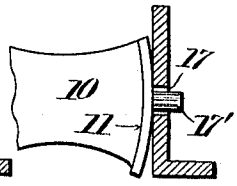
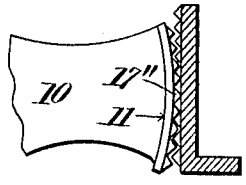


Fig. 7.



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UNITED STATES PATENT OFFICE.

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HEAD-MOTION FOR ORE-CONCENTRATORS.

1,019,650. Specification of Letters Patent. Patented Mar. 5, 1912.

Application filed May 13, 1910. Serial No. 561,066.

To all whom it may concern:

Be it known that I, JOHN F. ISBELL, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Head-Motions for Ore-Concentrators, of which the following is a specification.

This invention relates to certain new and useful improvements in head motions for machines and particularly such machines as are designed for the concentration of mineral bearing ores, and commonly called belt concentrators; these machines usually employ an endless rubber belt, with flanged sides, supported by drums or rollers so as to form an inclined surface say from four to six feet wide and twelve feet long. The belt travels up an incline and then down and around a lower drum or roller which dips into a water tank in which the mineral is collected. These belts also usually receive a shaking motion for the purpose of settling the ore particles, the shake being commonly at right angles to the inclination and travel of the belt. The ore is usually fed onto the belt at the head end thereof in a uniform stream across its entire width and flows down the incline, subjected to a side shaking motion, which deposits the ore on the belt. At the head end of the belt are arranged water jets which are arranged to wash back the lighter sand and let only the heavier minerals pass and become deposited in the water tank below. This general type of machine is old and well known, and the present invention relates to certain specific improvements, in mechanism for giving shaking motion to the machine.

With the above and other objects in view, my invention consists of the parts, and the constructions, arrangements and combinations of parts, which I will hereinafter describe and specifically point out in the claims.

In the accompanying drawings forming part of this specification and in which like reference characters indicate corresponding parts in the several views, Figure 1 is a side elevation of an ore concentrator embodying my invention; Fig. 2 is a cross sectional view on the line 2—2 of Fig. 1; Fig. 3 is an enlarged detail of a means for imparting side movement to the shaking frame of the machine; Figs. 4, 5, 6 and 7 are modifications of the construction shown in Fig. 3 and which will be hereinafter described.

In carrying out my invention I have used for present purposes the machine described and claimed in my former patent No. 964,425, dated July 12, 1910, but in so far as the present improvements are applicable, they may be applied to other types of machine without departing from the spirit of the invention.

The machine referred to and which is shown in Fig. 1 includes two channel irons, A, which extend the entire width of the machine, these irons being appropriately secured to a bed or foundation and being held together by four cast-iron saddles, B, the upper central portions of which are bored to form bearings for a horizontal transverse shaft, C, said shaft forming the axis about which the machine is tilted vertically to vary its inclination.

At the sides of the machine are suitable castings, D and E, which are appropriately secured to the shaft, C, these castings having secured to them the two longitudinally extending spring-carriers, C′, which are designed to support the shaking frame, C″, each of said spring-carriers having its front and rear ends rigidly secured to front and rear carrier-brackets, D′, which are in turn fastened to the shaking frame. By being rigidly connected to the shaking frame of the machine by means of these brackets, the spring-carriers prevent the shaking frame from sliding forwardly and backwardly, thereby holding it square. The construction of these brackets and particularly the bracket which is employed at the rear end of the machine may follow closely the construction of the similar parts found in my before-mentioned patent, as also the two-side adjusting levers, D^2, at the sides of the machine and extending horizontally in a forward direction, and which are adapted to be elevated or lowered to cause the frame of the machine to rock or tilt about the horizontal shaft, C, as fully explained in my former patent.

Secured to the upper part of the main side casting, D, are two bearings, *a*, in which the main driving shaft, *b*, is suitably mounted, said shaft being arranged parallel with the side of the machine and having secured to it an adjustable eccentric, F, Fig. 3, which

through the connections, which I will shortly describe, imparts the necessary side-shake to the frame and the belt which it supports, said driving-shaft having secured to it the driving pulley, G, and being also provided with appropriate fly wheels, H, H, there being two of these wheels, one upon each side of the transverse center of the machine and both wheels being suitably secured to the aforesaid driving shaft. As shown in Fig. 1, there is also secured to this driving shaft a cone pulley, I, and by suitable connections a belt, J, is adapted to be shifted on the cone pulley to increase or decrease the travel of the concentrator belt, K, which latter may be of any of the usual types found in machines of this character. The belt is designed to pass around suitable drums or rollers, *e*, *f*, *g*, *h* and *i*, the drums or rollers, *e* and *i*, forming the ends of the shaking frame, C''. The drums or rollers, *e*, *f* and *i*, are of the same diameter and the drums or rollers, *g* and *h*, are preferably of slightly smaller diameter and in practice are made somewhat shorter than the first-named drums or rollers. The belt being passed around the drum or roller, *e*, it passes under the drum or roller, *f*, and is adapted to deposit its concentrates in a box, L, in a manner common to this type of machines; after passing the drum or roller, *f*, the belt extends upwardly and over a drum or roller, *g*, and thus rearwardly to and over the drum or roller, *h*, to the roller, *i*, at the rear end of the machine. The belt also passes over a series of supporting rollers, M, whose ends are supported in a novel saddle or bearing, which forms one of the essential features of the present invention and the construction of which I will hereinafter describe.

The shaking table or frame, C'', is preferably composed of channel irons bolted together and with the rollers or drums, *e* and *i*, arranged at the extremities of said irons, as shown. This frame is further braced by suitable bars or spreaders, N, extending from one side of the frame to the other and serving to hold the sides rigidly and suitably spread apart; such additional bracing may be used as the conditions require. The belt from the cone pulley, I, extends to a small pulley, O, on the end of a horizontal shaft, P, this shaft being provided with a worm, Q, which is engaged by a worm gear, R, on the axis of the drum or roller, *e*, at the head end of the machine, these parts and the means for operating them being substantially of the character of the like elements found in my prior patent and which parts form no essential feature of the present improvements.

The first leading characteristic of the present invention is the means for imparting the side movement to the machine and which means include the single eccentric, F, which is adjustable by means of suitable bolts, 7, engaging notches, 8, in the collar portion, 9, of the eccentric, the bolts serving to hold the two parts of the eccentric in rigid position after adjustment. Associated with the eccentric is a short arm, 10, one end of which forms a strap for the eccentric, the strap being of a two-part character with the parts securely united by means of bolts, 2, and nuts, 3, as shown in Fig. 3; the other end of the short arm, 10, is curved to form a quadrant, 11, adapted to contact with a push plate, 12, suitably secured to the side of the shaking frame. Between the quadrant and the push-plate I prefer to interpose a strip of fiber or like material, 13, which is designed to hold this end of the quadrant in position and to give a rolling contact at this point. This connection is, however, capable of modification and, therefore, is not limited to the exact construction before mentioned and shown in Fig. 3; if desired, the curved or quadrant end of the short arm before mentioned may be supported upon a horizontal ledge or flange, 14, as shown in Fig. 4, or this end of the short arm may be suspended from a rod, 15, adjustably hung from a bracket or arm, 16, as shown in Fig. 5. Other modifications of the means for holding the quadrant arm in position and at the same time providing a rolling contact between it and the side of the machine are shown in Figs. 6 and 7, in the first of which the push-plate or a companion part is provided with an eye or opening, 17, and the quadrant or curved face of the arm has a pin or lug, 17', which operates through and has a sliding bearing in said opening; in Fig. 7, the curved face of the arm or quadrant is serrated or toothed at 17'' and is adapted to engage a corresponding surface on the opposed push-plate. In each of these forms and in all others of an equivalent character, the purpose is to hold the end of the quadrant or arm in position and to provide a certain rolling-contact between the curved face of the arm and the push-plate against which it operates, and either of the forms mentioned and all others of like character are considered to be within the scope of the present invention.

The shaking frame, the arm or quadrant, the eccentric, and the shaft in its bearings are all held in close operating relation by an adjustable spring, 18, located underneath the shaking frame and shown particularly in Fig. 2. This spring has a block, 20, which bears centrally upon the inner side of a lever, 21, the lower end of which is curved and provided with a knife-bearing engaging a suitable block, 22, bolted or otherwise secured to a fixed part, as one of the cast-iron saddles, B, before mentioned, the upper end of the lever engaging loosely and with a rocking-bearing in a socket, 23, secured to

one end of the spreaders, N, which are used for holding the sides of the frame suitably and rigidly apart, the outer face of the socket engaging the channel-iron of the shaking frame, as shown. By reason of this construction the shaking frame and the parts which give it the shaking motion are insured of close contact at all points, thereby increasing the effectiveness of the machine and reducing jar and excessive noise and wear to a minimum.

In addition to the inherent advantages of a single over a double eccentric drive in machines of this class, is the use of a short drive shaft, overhanging drive and cone pulleys, and the subsequent convenience in handling both the main and cone pulley bolts during breakage and repair.

The position of the head-motion, by which I mean the short arm or quadrant and its connections, relative to the rest of the machine being positively fixed and moving equally with all other parts of the machine, whenever the inclination of the frame, C″, is changed, there is little, if any, possibility of binding and heating of the eccentric and boxes, because of their getting out of line with other associated connections.

Whatever the specific means employed for holding up the quadrant arm, the essential feature is the employment broadly of the quadrant arm itself, because such an arm provides for operation free of any differential action and insures a positive and smooth movement under all conditions. It will be understood that this arm and its associated parts are equally applicable to and will be found of great value when used with, other so-called "vanning" machines besides the one of the specific type herein shown, and these parts can be applied to any machine in which a truly uniform reciprocating motion is required, without departing from the salient features of this portion of the present invention.

The operation of the invention will be readily understood from the foregoing description of parts and which operation does not depart materially from that fully given in my former application.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. The combination with an element to be reciprocated, of means for imparting reciprocal movement to said element, said means comprising a single eccentric at the side of and exterior to the element to be reciprocated, a divided eccentric strap, a driving shaft upon which the eccentric is mounted, one of the parts of said strap being rigid with an outwardly extending short arm, said arm having its outer end curved and adapted to operate with a rocking movement against the element to be reciprocated, to thereby move said element in one direction, means for moving said element in the other direction, and a rod suspended from the element to be reciprocated having its lower end engaging the curved end of said arm to hold the arm in operative relation to the engaging portion of the element to be reciprocated.

2. The combination with an element to be reciprocated, of a shaft exterior thereto, an eccentric thereon, said eccentric having a strap with an integral short arm extending inwardly toward the outer surface of said element, the face of said arm being curved and having a loose engagement with the outer surface of the element to be reciprocated, means for maintaining the curved face of said arm in engagement with the element to be reciprocated, and means for holding the eccentric, its arm and the element to be reciprocated in operating relation, said last means comprising a spring beneath the element to be reciprocated and a lever fulcrumed at one end and having the opposite end loosely engaging the element to be reciprocated, said spring yieldingly bearing against an intermediate part of said lever in opposition to the eccentric.

3. The combination of an element to be reciprocated and means for imparting reciprocal movement thereto, said element provided with spreader bars having socket members on the outer ends, reciprocating devices and means for holding the element to be reciprocated in contact with said devices, said means comprising a lever having a fixed knife-edge fulcrumed at one end and having the opposite end provided with a head which engages a socket member, and a spring beneath the element to be reciprocated and bearing against the central part of said lever.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN F. ISBELL.

Witnesses:
J. M. CALLON,
WALKER J. BOUDWIN.